PROGRESS

OF

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MEDICINE.

UNDER THE CHARGE OF

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General Principles of the Therapeutic Inoculation of Bacterial Vaccines as Applied to the Treatment of Tuberculous Infections.—A. E. WRIGHT (*Lancet*, 1905, ii., 1598). In previous communications Wright has been able to show that the blood fluids play an important part in phagocytosis. Quite distinct from the lysins, the agglutinins, and the antitoxins he has found a fourth substance present which prepares foreign bodies before the leukocytes can take them up. The presence of this substance is very easily demonstrable. If we make a mixture of a bacterial emulsion of normal salt solution, and of blood corpuscles, thoroughly washed so as to be freed from all serum, and incubate the mixture for fifteen minutes and then place it upon a slide and stain, we find that none or at least only a few of the organisms have been taken up by the leukocytes. If, on the other hand, we use blood serum instead of normal salt solution, so that we have a mixture of bacterial emulsion of blood serum and of washed corpuscles, we will find that after fifteen minutes' inoculation a very active phagocytosis has taken place. These substances in the serum, which prepare the bacteria for ingestion, Wright calls opsonins. By simple variations of the above experiments it has been shown that their action is upon the bacteria and not upon the leukocytes; that before combination they are thermolabile, but when once united with the bacteria the opsonic effect persists after heating to 60° for a long period of time; that heated serum cannot be reactivated by the addition of normal serum, so that probably no complement-like body plays a part in its action; that the blood of various individuals varies considerably in its phagocytic power, but in this variation the leukocyte is practically a uniform factor, the differences being due to the content of the serum in opsonins. Wright has also devised a method for estimating the amount of opsonic power in a given specimen of serum, and although the accuracy of the method has been questioned, he and his pupils claim for it constant and precise results even within narrow limits.

According to Wright's views on immunity there are two forms of bacterial infection: (*a*) bacterial infections in which the machinery of immunization is inactive, and (*b*) bacterial infections in which this machinery is called into action. In one class of infections the opsonic power with respect to the infecting micro-organism hardly varies from day to day, remaining always inferior to that of normal blood. In another class of infections the opsonic power is continually fluctuating, the range of variations being from far below to far above the normal. These two categories of infections correspond respectively to strictly localized and systemic infections. In the localized, the low opsonic index was probably present before the infection, in the general, the wide variations are caused by periodic activity of the machinery of immunization called into play by the varying discharge of bacterial elements into the blood. These differences are no doubt fundamental, one type leading rapidly to death or recovery, the other often going on a lifetime. By vaccines we supply in the latter artificially a stimulation of the apparatus of immunization.

Wright uses in a very interesting way the estimation of the opsonic index of the blood, to determine the dose of the bacterial vaccines to be used and the proper time for injections. Although the results here given have been worked out in a similar manner for other diseases we shall refer only to the treatment of tuberculosis. For the inoculations Koch's T. R. or new tuberculin, which is a ground-up bacillus emulsion, was used. After an inoculation of tuberculin the resistance as measured by the opsonic power of the serum abruptly drops, this negative phase being followed by a positive phase when the opsonic index rapidly rises to a point far above normal. From this height there is again a rather abrupt drop and then a slow and gradual decline to the base line, or in some instances the opsonic power remains for a very long period at a point a little above its position before the injection. If the inoculation be repeated during the negative phase there is a cumulative action so that the resistance is driven down and down, but Wright has not been able to produce a satisfactory cumulative positive phase by injecting while the opsonic curve is rising. Wright believes that it is not necessary to produce constitutional disturbances in order to set the immunization machinery into action and that the capacity of the organism for immunizing response is not limited, but that this apparatus is easily stimulated and easily fatigued and we must guard with great care the demands we make upon it. He believes he obtains maximal immunizing responses from doses of tuberculin corresponding to from 1/1000 to 1/600 mg. of tubercle bacillus powder. If the negative phase be very well marked and tends to increase after each subsequent injection he thinks too large a dose is being given, whereas if the negative reaction becomes less intense after each injection he thinks the patient is making good progress. A second inoculation is undertaken only when the effects of the first have worn off.

This is a method we have at hand to increase the opsonins in the blood stream, but, as has been shown in relation to other infections at the point of localized disease, the amount of protective substances is always less than in the general circulation. It seems evident that we could expect little benefit to a localized lesion if the serum in the general circulation possessed a low degree of resistance, but if its immunizing value be high, any method that would stimulate the local circulation and keep the area of infection bathed with a constantly renewed supply of lymph would be of marked value. Bullock has made the interesting observation that in a large number of lupus cases being treated by the Finsen rays, those who were doing well possessed a high opsonic index, those who were not improving, a low. Wright thinks the various methods of local treatment of tuberculous lesions, such as Finsen and *x*-rays, are useful only in improving local circulatory conditions and that they are probably of little value unless the serum has a high opsonic index.

The cases Wright has treated are principally skin and surgical tuberculosis. It would be too lengthy to view in detail his results, but he thinks they are encouraging and that his method is a very valuable addition to tuberculin therapy. By following the method carefully he believes many of the unsatisfactory results attending its use will be avoided.

The Importance of Syphilis of the Liver in the Diagnosis of Abdominal Tumors.—König (*Berl. klin. Woch.*, 1905, xlii., 137) cites three cases of syphilis of the liver to point a lesson in the difficulties of diagnosis. The first case, a man aged twenty-two years, was admitted complaining that for two years he had had paroxysmal attacks of colicy pain in the epigastrium, usually relieved by vomiting. Four months before admission he had noticed a tender mass in the abdomen which had gradually increased in size and become very painful. There was no history of syphilis. On examination a rounded, very tender mass was found below and to the left of the ensiform process, probably connected with the left lobe of the liver. He had no fever. The symptoms being severe and the diagnosis uncertain laparotomy was performed. The stomach and intestines were found normal. The left lobe of the liver was enlarged, firm, and covered with numerous grayish, slightly elevated, hard nodules. Microscopic examination of one of these nodules removed for diagnosis proved it to be a gumma. Subsequent to the operation the development of an interstitial keratitis and a chorioretinitis led to the diagnosis of hereditary lues.

The second case, a woman, aged twenty-eight years, had been treated in various hospitals for severe pain in the region of the stomach and liver. An enlarged liver and an abdominal tumor (kidney?) had been previously made out on the medical division. The upper portion of the abdomen was moderately distended by a large mass lying in the right hypochondriac and epigastric regions and extending to the navel. The great mobility of the tumor and its extension backward into the renal region left it a matter of doubt whether it arose from the liver or the kidney and what the nature of the tumor was. But the suspicion of its renal origin was so strong that at operation the abdomen was first opened in the lumbar region and finding the kidney normal, then in front. The mass thus exposed was as large as two fists and connected with the right lobe of the liver by a very much constricted base (Schnur-